

**REMARKS**

**Office Action**

The paragraphing of the Examiner is adopted.

**Paragraph 2 (Specification)**

The Examiner points out that, in the Abstract, it appears that reporting  $\lambda > 1$  for both the "storing" and "releasing" phases of the exhaust gas purification process appears to be in error.

The Examiner is correct. Applicants have corrected the Abstract to say storing when lean ( $\lambda > 1$ ) and releasing when rich ( $\lambda < 1$ ).

The Examiner points out that on pg. 6 In. 6, the reference to "zinc oxide" appears to be in error.

The Examiner is correct - entry of the correction to zirconium oxide is respectfully requested.

**Paragraph 3 (Response to Preliminary Amendment)**

The replacement pages 1, 3 and 5 mentioned on the 1<sup>st</sup> page of the Preliminary Amendment dated July 24, 2001 (paper no. 2) have been entered.

**Paragraph 4 (Claim Objections)**

The Examiner points out that, since claim 9 never mentioned a "first noble metal", then there is no antecedent basis in claim 9 for the "second noble metal" mentioned in claim 10.

Further, there is no antecedent basis in claim 9 for the "noble metals" mentioned in claims 12 and 13.

Further, in claim 11, "extrudate" is misspelled.

Applicants appreciate the Examiner's helpful comments and have amended the claims accordingly. Entry is respectfully requested.

**Paragraphs 5 and 6 (Claim Rejections - 35 USC § 112)**

Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Prima facie, it would not seem possible for  $\lambda > 1$  for both the "lean motor operating phase" and the "rich motor operating phase". It would seem that one of these phases must have  $\lambda < 1$ . No new matter can be entered into the specification.

The Examiner is correct - claim 9 is amended as was the Abstract to recite storing when lean ( $\lambda > 1$ ) and releasing when rich ( $\lambda < 1$ ).

According to the Examiner, in claim 9, the claim language does not particularly point out and distinctly set forth if porous carrier may comprise at least 50 wt. % of titanium oxide, silicon oxide or a zeolite, or if the "at least 50 wt. %" only limits the zirconium oxide, without further limiting the titanium oxide, etc.

In response, Applicants amend claim 9 (and add new claim

18) reciting "comprise at least 50 wt. % of zirconium oxide".

Regarding claims 10 and 16, according to the Examiner the phrase "for example" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Applicants have either removed exemplary material to dependent claims or have removed the "preferably" language from the claim.

**Paragraphs 7-9 (Claim Rejections - 35 USC § 103)**

Claims 9-16 are rejected under 35 U.S.C. 103(a) as being obvious over EP 0 890 389 A1.

According to the Examiner, in col. 4, "Example B" in EP 0 890 389 A1, the use of catalyst of the formula: "Ag-Al<sub>2</sub>O<sub>3</sub>//Pt/Rh-Al<sub>2</sub>O<sub>3</sub>" (emphasis added by Applicants) is disclosed for treating the exhaust gas emitted from an internal combustion engine.

The Examiner acknowledges that there is a difference between the Applicants' claims and EP 0 890 389 A1 in that Applicants' claim 9 reports that the carrier may be **zirconia, titania, silica or zeolite** (whereas the catalyst of "Example B" and Fig. 6 in EP 0 890 389 A1 reports the use of **alumina** as the support).

In response, Applicants submit that the Examiner is correct in his understanding regarding this reference and the original claims of the present application. This reference is discussed at page 1 of the present specification, and concerns an Ag-Al<sub>2</sub>O<sub>3</sub>//Pt/Rh-Al<sub>2</sub>O<sub>3</sub> type catalyst which is a different class of

catalyst from the catalyst of the present invention.

Claim 9 has been amended to more clearly distinguish the present invention over EP 0 890 389 A1, namely, to recite that the nitrogen oxide storing and catalytically effective solid is

- free of silver and silver compounds,
- comprises a noble metal provided on a porous carrier substance,
- wherein the porous carrier substance is comprised of at least 50 wt.% zirconium oxide, and
- wherein the noble metal comprises rhodium.

As discussed in the introductory portion of the present specification, in the case of NO<sub>x</sub> storage catalytic converters with **alumina** support the relationship of the lean motor operating phase to the rich motor operating phase was found to be problematic. It is only in a lean-rich cycle with respectively equal durations of a lean and rich motor operating phases (for example 60 seconds each) that, at a temperature of 350°C, a maximum NO<sub>x</sub> conversion of approximately 65% could be achieved. With shorter duration of the rich motor operating phase in comparison to the lean motor operating phase, a lower NO<sub>x</sub> conversion is achieved. Thus, there remained a need for to provide a process for denitrification of exhaust gasses from **primarily lean operated** internal combustion engines, which process achieves a good effectiveness even in the case of very short rich motor operating phases. The present inventors met this need with the present process, employing the recited

supports, which (in the claims, as amended) are clearly not alumina supports.

The Examiner refers to col. 2 lns. 4-8 of EP 0 890 389 A1 which appears to list materials that may be used as the catalyst support - to include the alumina of "Example B" in EP 0 890 389 A1 as well as the zirconia, titania, silica and zeolite of Applicants' claim 9.

In response, the Examiner is requested to note the discussion at page 1 of the present specification describing the composition and limitations of the prior art material of EP 0 890 389 A1. This reference teaches an **Ag-Al<sub>2</sub>O<sub>3</sub>//Pt/Rh-Al<sub>2</sub>O<sub>3</sub>** type catalyst. Al<sub>2</sub>O<sub>3</sub> does not perform any storage function. EP 0 890 389 A1 thus requires "Ag- und edelmetallhaltigen Verbindungen" - silver and preferably additionally rare earth metal compounds.

Further, if one could read EP 0 890 389 A1 as teaching zirconium oxide, the present invention as claimed would still be unobvious, since there remains the teaching in this reference that silver is indispensable, silver being responsible for the NO<sub>x</sub> storage function. Those working in the art, reading EP 0 890 389 A1, would be of the opinion that any catalyst omitting silver would be inoperable, silver being taught to be an indispensable component of EP 0 890 389 A1. Those working in this art, following the teachings of this reference, would find it completely surprising that, if one used zirconium oxide as the carrier, this zirconium oxide also performs a storage function, thus silver is in fact not necessary. Accordingly, the invention as presently claimed is unobvious over the state

of the art.

In conclusion, the invention as presently claimed cannot be arrived at by the simple replacement of alumina by zirconia (much less titania, silica or zeolite) described in col. 2 lns. 4-8 in EP 0 890 389 A1 as suggested by the Examiner. Zirconium oxide is not equivalent to alumina (or titania, silica or zeolite). Accordingly, the prima facie case of obviousness is overcome.

The Examiner comments that "Ag-Al<sub>2</sub>O<sub>3</sub>/Pt/Rh-Al<sub>2</sub>O<sub>3</sub>" fairly suggests that the Pt and Rh are deposited on the same alumina carrier, as set forth in Applicants' claim 13.

In response, Applicants point out that claim 9, as amended, excludes silver and requires that the porous carrier substance is comprised of at least 50 wt.% zirconium oxide. The ability of such a composition to perform a NO<sub>x</sub> storage function is surprising when compared to the teachings of EP 0 890 389 A1.

#### **Non-applied References**

The Examiner cites, but does not apply, numerous references, which are merely considered to represent the state of the art.

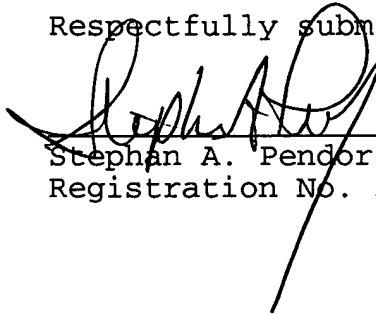
Applicants have reviewed these references and have no further comments.

U.S. Application No. 09/912,004  
AMENDMENT A

Attorney Docket: 3926.030

Entry and favorable consideration prior to consideration  
are respectfully requested.

Respectfully submitted,

  
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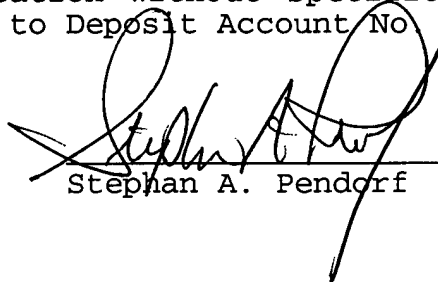
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Date: **July 7, 2003**

**CERTIFICATE OF MAILING AND AUTHORIZATION TO CHARGE**

I hereby certify that the foregoing AMENDMENT A for U.S. Application No. 09/912,004 filed July 24, 2001, were deposited in first class U.S. mail, postage prepaid, **Mail Stop:** Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on **July 7, 2003**.

The Commissioner is hereby authorized to charge any additional fees which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account No. 16-0877.

  
Stephan A. Pendorf